A1 B1 The present application is related to the subject matter of U.S. App. No. 09/244,754, filed February 5, 1999, entitled ENHANCED SYNCHRONIZATION BURST FOR OFDM SYSTEMS, co-filed and co-assigned with the present application.

In the Claims

Please replace the pending claims with the following:

1. (Amended) A method for transmitting an OFDM signal via a channel to facilitate receiver synchronization comprising:

A2

transforming a series of frequency domain data symbols into a burst of time domain symbols;

appending to a beginning of said time domain burst a cyclic prefix duplicating a last segment of said time domain burst, wherein said cyclic prefix includes a first portion having length ν wherein ν is greater than or equal to an impulse response of said channel; and further includes a second portion after said first portion to facilitate receiver synchronization; and

transmitting said time domain burst with said appended cyclic prefix.

B2

2. A method for transmitting an OFDM signal to facilitate receiver synchronization comprising:

developing a frequency domain burst wherein periodically spaced frequency domain symbols of said burst have values including non-zero values and frequency domain symbols between said periodically spaced frequency domain symbols have null energy; and

transmitting said frequency domain burst.

3. (Amended) A method for synchronizing to an OFDM signal received via a channel, said method comprising:

A3 cont

A3 Concl

receiving successive OFDM bursts wherein each of said successive OFDM bursts includes in the time domain, a series of N time domain symbols, a cyclic prefix duplicating a last segment of said series of N time domain symbols, wherein said cyclic prefix includes a first portion having length ν wherein ν is greater than or equal to an impulse response of said channel; and further includes a second portion after said first portion to facilitate receiver synchronization;

evaluating a first cost function over said successive OFDM bursts that varies depending on receiver burst timing alignment to said successive OFDM bursts; and

setting said burst timing alignment to optimize said first cost function, thereby synchronizing receiver burst timing to transmitter burst timing.

4. The method of claim 3 wherein said first cost function evaluates degree of match between said second portion of cyclic prefix and a corresponding portion of said N time domain symbols.

A4

5. (Amended) The method of claim 3 wherein said length ν is initially unknown, said first cost function varies depending on said length ν and said setting step further varies said length ν of said cyclic prefix to optimize said first cost function.

6. The method of claim 3 wherein setting comprises:

determining an optimal burst timing that will be optimal for all channel impulse response durations up to ν.

7. The method of claim 3 further comprising:

determining a fractional component of a receiver frequency alignment as measured in a unit defined by spectral width of a single OFDM frequency domain symbol based on said burst timing alignment as varied to optimize said first cost function and on a second cost function that varies according to frequency alignment.

8. (Amended) The method of claim 7 wherein each of said successive OFDM bursts include frequency domain training symbols at predetermined positions and having predetermined values; and further comprising:

setting an integer component of said receiver frequency alignment so that said frequency domain training symbols are received at their predetermined positions.

A5 cont C1

9. (Amended) A method for synchronizing a receiver to an OFDM signal comprising:

receiving at least one synchronization OFDM burst wherein periodically spaced frequency domain symbols of said at least one synchronization OFDM burst have predetermined values and tones between said periodically spaced frequency domain symbols have null energy;

evaluating a first cost function that varies depending on burst timing alignment, said first cost function measuring time domain periodicity of said synchronization OFDM burst; and

setting said burst timing alignment to optimize said first cost function.

B3

10. (Amended) The method of claim 9 further comprising

computing a receiver frequency offset based on said burst timing alignment as optimized by setting said burst timing alignment to optimize said first cost function.

11. (Amended) A method for synchronizing a receiver to an OFDM signal comprising:

receiving at least one OFDM synchronization burst wherein periodically spaced frequency domain symbols of said at least one OFDM synchronization burst have values including non-zero values and frequency domain symbols between said periodically spaced frequency domain symbols have null energy; and

determining burst timing alignment and frequency offset responsive to optimization of cost functions determined in response to contents of said at least one OFDM synchronization burst.

12. (Amended) A system for transmitting an OFDM signal via a channel to facilitate receiver synchronization comprising:

a transforming stage that transforms a series of frequency domain data symbols into a burst of time domain symbols; and

A5 concl

a cyclic prefix appending stage that appends to a beginning of said burst of time domain symbols, a cyclic prefix duplicating a last segment of said burst of time domain symbols, wherein said cyclic prefix includes a first portion having length ν wherein ν is greater than or equal to an impulse response of said channel; and further includes a second portion after said first portion to facilitate receiver synchronization.

13. (Amended) The system of claim 12 further comprising:

a transmission stage that transmits said burst of time domain symbols with said appended cyclic prefix.

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14. (Amended) A system for transmitting an OFDM signal to facilitate receiver synchronization comprising:

a synchronization burst generation stage that develops a frequency domain burst wherein periodically spaced frequency domain symbols of said frequency domain burst have values including non-zero values and frequency domain symbols between said periodically spaced frequency domain symbols have null energy; and

a transform processing stage that transforms said frequency domain burst into a time domain burst.

15. The system of claim 14 wherein at least one of said periodically spaced frequency domain symbols carries data.

A6 cont

16. (Amended) A system for processing an OFDM signal received via a channel, said system comprising:

an OFDM reception system that receives successive OFDM bursts wherein each of said successive OFDM bursts includes in the time domain, a series of N time domain symbols, a cyclic prefix duplicating a last segment of said series of N time domain symbols, wherein said cyclic prefix includes a first portion having length ν wherein ν is greater than or equal to an impulse response of said channel; and further includes a second portion after said first portion to facilitate receiver synchronization; and

a synchronization block that evaluates a first cost function over said successive OFDM bursts that varies depending on receiver burst timing alignment to said successive OFDM bursts; and that sets said burst timing alignment to optimize said first cost function, thereby synchronizing receiver burst timing to transmitter burst timing.

A6 Concl

17. (Amended) The system of claim 16 wherein said first cost function evaluates degree of match between said second portion of said cyclic prefix and a corresponding portion of said N time domain symbols.

18. The system of claim 16 wherein said first portion of said cyclic prefix has initially unknown length, said first cost function varies depending on said length and said synchronization system further varies said cyclic prefix length to optimize said first cost function.

19. (Amended) The system of claim 16 wherein said synchronization block determines optimal burst timing that will be optimal for all channel impulse response durations up to said length ν of said first portion of said cyclic prefix.

A7 cont

20. (Amended) The system of claim 16 wherein said synchronization block determines a fractional component of a receiver frequency alignment as measured in a unit defined by spectral width of a single OFDM frequency domain symbol based on said burst timing alignment as varied to optimize said first cost function and on a second cost function that varies according to frequency alignment.

21. (Amended) The system of claim 20 wherein each of said OFDM bursts include frequency domain training symbols at predetermined positions and having predetermined values; and wherein said synchronization block sets an integer component of said receiver frequency alignment so that said frequency domain training symbols are received at their predetermined positions.

22. (Amended) A system for processing an OFDM signal comprising:

A7 B5 Concl C1

an OFDM receiver system that receives at least one synchronization OFDM burst wherein periodically spaced tones of said at least one synchronization OFDM burst have values including non-zero values and tones between said periodically spaced tones have null energy; and

a synchronization block that evaluates a first cost function that varies depending on burst timing alignment, said first cost function measuring periodicity of said synchronization OFDM burst; and

wherein said synchronization block sets said burst timing alignment to optimize said first cost function.

23. The system of claim 22 wherein said synchronization system computes a receiver frequency offset based on said burst timing alignment that optimizes said first cost function.

24. (Amended) A system for processing an OFDM signal comprising:

A8 C1

an OFDM receiver system that receives at least one OFDM synchronization burst wherein periodically spaced frequency domain symbols of said burst have values including non-zero values and frequency domain symbols between said periodically spaced frequency domain symbols have null energy; and

a synchronization block that determines burst timing alignment and frequency offset responsive to optimization of cost functions determined in response to contents of said at least one OFDM synchronization burst.